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EXAMINER	
CHANDRA, SATISH	

ART UNIT	PAPER NUMBER
1792	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/521,444	FINK, STEVEN T.	
	Examiner	Art Unit	
	SATISH CHANDRA	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 January 2009*.

2a)☒ This action is FINAL. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *56 - 70* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *56 - 70* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 January 2009* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 56 and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stall et al (US 5,544,618) in view of Komino (US 6,634,845) and Makino et al (US 5,391,260).

Stall et al discloses:

Regarding Claims 56 and 62: an apparatus and a method of making an improved vacuum processing apparatus 10 (Fig 1) , comprising a processing chamber 100 (Fig 1), including a lower wall; an upper wall; a side wall coupled to the lower wall and the upper wall 104; and a plurality of pumping ports 178 (one pumping port disclosed in column 11, lines 14 – 21) and the other port not labeled (Figs 1, 2) formed in one of the lower cylindrical side wall 106 of the processing chamber; connecting a seal (blind flange, lid) to the second pumping port (not labeled, 180 degrees across the exhaust port 178, Figs 1 and 2) such that the seal blocks the gas flow through the second pumping port. Stall discloses deposition process can be evacuated through the exhaust connection 178, which can be appropriately connected to an exhaust conduit, vacuum pump, or the like, as desired.

Stall et al does not disclose:

Regarding claims 56, removing the lid from the second pumping port and providing a substitute pumping cell to the second pumping port.

Komino discloses a processing chamber (Fig 1) comprising:

Regarding claim 56, a processing vessel (chamber) PC having a lower wall (not labeled) and a side wall (not labeled) having a plurality of pumping ports (not labeled) disposed along the periphery of the floor in the lower chamber separated from each other, symmetrically spaced about a chuck assembly 84, and each pumping port connected to a pump cell (pump 88 and valve 89; Fig 16, Column 14, lines 42 - 64). Komino further discloses the pressure adjust valves 89 are closed when not in operation (Column 15, lines 25 – 28). Komino further discloses the pressure adjust valves 89 are closed when not in operation (Column 15, lines 25 – 37). The pressure adjust valves 89 are opened, when in operation, so as to maintain the process chamber PC at a predetermined pressure generated by the turbo molecular pumps 88 (Column 15, lines 26 – 32). When one of the pump 88 fails, the failed pump 88 (Column 17, lines 9 – 34) can be removed from the process module 80 while the process module is in operation so as to replace the failed pump. When the control unit 95 detects a failed pump 88 via one of the sensors 96, the control unit 95 closes one of the valves 89, corresponding to the failed pump 88 so as to close the passage between the failed pump 88 and the process chamber PC. Accordingly, the negative pressure environment can be maintained when the failed pump 88 is removed from the housing 82 of the process module 80. Thereafter, the failed pump 88 is repaired or replaced, and the normal pump

88 is mounted to the housing 82. The connection of the normal pump 88 is detected by the corresponding one of the sensors, and the control unit 95 opens the valve 89 and returns the evacuation capability of the rest of the pumps 88 so that the evacuation is resumed by the twelve pumps 88.

Therefore, it would also have been obvious to a skilled artisan at the time the invention was made to provide a valve upstream of the vacuum pump in the apparatus of Stall as taught by Komino.

It would also have been obvious to a skilled artisan at the time the invention was made to remove the pumping cell including the pump and valve for repairs in the apparatus of Stall.

It would also have been obvious to one of ordinary skill in the art at the time the invention was made to remove the pumping cell from the first pumping port and provide a substitute seal (lid) to the first pumping port such that the lid blocks a gas flow through the first pumping port and remove the lid from the second pumping port and provide a substitute second pumping cell to the second pumping port in the apparatus of Stall.

The motivation for providing a valve is to provide isolation means upstream of the pump in the apparatus of Stall as taught by Komino.

The motivation for removing the pumping cell including the pump and the valve is to inspect and repair the valve and the pump both at the same time.

The motivation for removing remove the pumping cell from the first pumping port and provide a substitute seal (lid) to the first pumping port such that the lid blocks a gas flow through the first pumping port and remove the lid from the second pumping port and

provide a substitute second pumping cell to the second pumping port in the apparatus of Stall is to rearrange the pumping cell and the lid between the pumping ports.

Stall and Komino do not disclose: Regarding claim 56, that the gas flow is reconfigured by the providing the substitute seal to the first pumping port and the providing the substitute pumping cell to the second pumping port.

Makino et al discloses:

Regarding claim 56, in the first to third preferred embodiments (Column 5, lines 56 – 67), the exhaust pump 18 is provided (Fig 6) on one side-wall of the vacuum processing chamber. This location of the exhaust pump will cause a deviation of gas flow towards the vacuum pump upon evacuation of the chamber. To cope with this deviation, a pair of exhaust pumps (Fig 7) 42 may be provided on the opposite lower side walls of a vacuum processing chamber 41, so as to eliminate the deviation of gas flow upon evacuation (Column 6, lines 1- 6) of the chamber 41).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the gas flows towards the pumping cell of the second pumping port (reconfiguration of the gas flow towards the second vacuum port) when a seal (flange) is provided to the first pumping port blocking the gas flow in the apparatus of Stall et al and Komino as taught by Makino et al.

The motivation for reconfiguring the gas flow when a seal (flange) is provided to the first pumping port and a pumping cell is provided to the second pumping port in the apparatus of Stall et al and Komino is to optimize the apparatus of Stall et al and Komino.

Claims 57 – 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stall et al (US 5,544,618) in view of Komino (US 6,634,845) and Makino et al (US 5,391,260) as discussed in claims 56 and 62 above and further in view of Dandl et al (US 2001/0016166) and Os et al (US 6,178,918).

Stall et al, Komino and Makino et al do not disclose:

Regarding claim 57, the side-wall has a height of at most about four inches.

Regarding claim 58 and 59, process chamber is made of a plate stock of aluminum having a thickness of about four inches.

Dandl et al discloses:

Regarding claim 57, the vertical height of the space between a substrate and a partition wall 4 is of the order of 10.2 cm (about 4 inches, Para 0124, Fig 1).

Os et al disclose:

Regarding claim 58 and 59, a cylindrical process chamber made of aluminum.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the vertical height of the side wall about four inches; make the process chamber from stock of aluminum in the apparatus of Stall et al, Komino and Makino et al as taught by Dandl et al and Os et al respectively.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the process chamber from plate stock of aluminum of four inches thick in the apparatus of Stall et al, Komino and Makino et al as taught by Dandl et al and Os et al.

The motivation to provide a side wall with a height of about four inches is to optimize the size of the process chamber in order to minimize fabrication and other costs in the apparatus of Stall et al, Komino and Makino et al.

The motivation for making the process chamber from a single stock of aluminum plate is again to minimize fabrication costs in the apparatus of Stall et al, Komino and Makino et al.

The motivation for making the process chamber from plate stock of aluminum of four inch thick in the apparatus of Stall et al, Komino and Makino et al is to optimize the thickness of the processing chamber.

Claims 60 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stall et al (US 5,544,618) in view of Komino (US 6,634,845) and Makino et al (US 5,391,260), Dandl et al (US 2001/0016166) and Os et al (US 6,178,918) as discussed in claims 57 - 59 above and further in view of Ishii (US 5,685,942).

Stall et al, Komino, Makino et al, Dandl et al and Os et al do not disclose:

Regarding claim 60, the step of making the process chamber comprises a molding process.

Regarding claim 61, the lower wall is a plate and the side-wall is a rolled cylinder which is welded into the plate.

Ishii discloses:

Regarding claim 60, a plasma etching equipment 1 (Fig1) includes a processing housing 2 molded into a circular cylinder or a rectangular cylinder out of conducting material such as aluminum (Column 3, lines 30 – 35).

Regarding claim 61, it is well known in the art that two pieces can be joined together by welding.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a molding process for fabricating a process chamber in the apparatus of Stall et al, Komino, Makino et al, Dandl et al and Os et al as taught by Ishii. It would have been obvious to a skilled artisan to combine the elements of prior art to yield predictable results such as using a molding process for fabricating a process chamber in the apparatus of Stall et al, Komino, Makino et al, Dandl et al and Os et al as taught by Ishii.

The motivation for using a molding process for fabricating a process chamber is to provide an alternate and equivalent means of fabricating process chambers as taught by Ishii.

Claims 63 - 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stall et al (US 5,544,618) in view of Komino (US 6,634,845) and Makino et al (US 5,391,260), Dandl et al (US 2001/0016166) and Os et al (US 6,178,918) as discussed in claims 57 - 59 above and further in view of Ohmi et al (US 6,357,385).

Stall et al, Komino, Makino et al, Dandl et al, Os et al were discussed above.

Komino further discloses a chuck 84 (Fig 17) positioned inside the vacuum chamber. A plurality of valves 89 are provided on the pumping ports (not labeled, Fig 17) connected to vacuum pumps 88.

Stall et al, Komino, Makino et al, Dandl et al and Os et al do not discuss:

Regarding claim 63: providing three pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly.

Regarding claim 64, connecting three pumping cells to the process chamber, wherein each one of the three pumping cells are connected to a respective one of the three pumping ports and the three pumping ports being configured to receive said substitute seal in order to reconfigure the gas flow in the vacuum processing apparatus.

Regarding claim 65, providing two pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly on opposing sides thereof.

Regarding claim 66, connecting two pumping cells to the process chamber, wherein each one of the two pumping cells are connected to a respective one of the two pumping ports and the two pumping ports being configured to receive said substitute seal in order to reconfigure the gas flow in the vacuum processing apparatus.

Ohmi et al discloses:

Regarding claims 63 – 66, in Figs 44A, 45 and 46, various embodiments of a vacuum processing chamber are disclosed e.g., in Fig 44A, the vacuum container 4401 has a shape close to a square, and four vacuum pumps 4402 are provided in the comers of this vacuum container 4401; in Fig 45, three pumping ports (gas outlets,

4504) comprising three vacuum pumps and in Fig 45; and two pumping ports (gas outlets, 4604) comprising two vacuum pumps. Ohmi et al further discloses that in this way, if exhaust is carried out by a plurality of vacuum pumps aligned around the substrate substantially axisymmetrical to an axis perpendicular to the substrate surface and running through the center of the substrate, uniform gas flow can be realized in a rotational direction above the substrate, without causing hardly any lowering of gas conductance (Column 14, lines 55 – 67, Column 15, lines 1 – 10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide three pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly and containing three valves and three pumping cells; provide two pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly and containing two valves and two pumping cells in the apparatus of Stall et al, Komino, Makino et al, Dandl et al and Os et al as taught by Ohmi et al.

It would also have been obvious that exhaust is carried out by a plurality of vacuum pumps aligned around the substrate substantially axisymmetrical to an axis perpendicular to the substrate surface and running through the center of the substrate, uniform gas flow can be realized in a rotational direction above the substrate, without causing hardly any lowering of gas conductance in the apparatus of Stall et al, Komino, Makino et al, Dandl et al and Os et al as taught by Ohmi et al.

The motivation for providing provide three pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly and containing

three valves and three pumping cells; provide two pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly and containing two valves and two pumping cells in the apparatus of Stall et al, Komino, Makino et al, Dandl et al and Os et al is to provide an alternate and equivalent arrangement of vacuum pumps in a processing apparatus as taught by Ohmi et al.

Claim 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stall et al (US 5,544,618) in view of Komino (US 6,634,845) and Makino et al (US 5,391,260) as discussed in claims 56 and 62 above and further in view of Carducci et al (US 2003/0038111).

Stall et al, Komino and Makino et al do not disclose: the process chamber is configured to have a chamber liner configured to reduce the open volume within the process chamber.

Carducci et al discloses:

Regarding claim 67, chamber liner 104 is disposed as a first liner 134, a second liner 118 and the lid liner 104 (Para 0056) adjacent to walls 106, 108 and the lid 102.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to install a liner in the apparatus of Stall et al, Komino and Makino et al as taught by Carducci et al respectively.

The motivation to provide a liner in the process chamber is to prevent the plasma gases from attacking the process chamber walls in the apparatus of Stall et al, Komino and Makino et al as taught by Carducci et al.

Claim 69 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stall et al (US 5,544,618) in view of Komino (US 6,634,845) and Makino et al (US 5,391,260) as discussed in claims 56 and 62 above.

Stall, Komino and Makino were discussed above.

Stall, Komino and Makino do not disclose: the substitute lid provided to the first pumping port is the lid removed from the second pumping port and the substitute pumping cell provided to the second pumping port is the pumping cell removed from the first pumping port.

However, It would have been obvious to a skilled artisan at the time the invention was made to provide a lid to the first pumping port removed from the second pumping port and the substitute pumping cell provided to the second pumping port is the pumping cell removed from the first pumping port in the apparatus of Stall, Komino and Makino.

The motivation for providing a lid to the first pumping port removed from the second pumping port and the substitute pumping cell provided to the second pumping port is the pumping cell removed from the first pumping port in the apparatus of Stall, Komino and Makino is to use the same part thus minimizing inventory in the apparatus of Stall, Komino and Makino.

Claim 70 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stall et al (US 5,544,618) in view of Komino (US 6,634,845) and Makino et al (US 5,391,260) as discussed in claims 56 and 62 above.

Stall et al, Komino and Makino et al were discussed above.

Stall et al, Komino and Makino et al do not disclose: removing the seal (valve) from the second pumping port includes removing the seal (valve) such that the seal (valve) does not contact the lower wall, the upper wall, or the side wall.

However, it would have been obvious (by looking at Fig 1 of Stall et al) to one of ordinary skill in the art at the time the invention was made that removing the seal from the second pumping port, the seal will not contact the lower wall, the upper wall or the side wall in the apparatus of Stall et al, Komino and Makino et al.

Claims 56, 62, 68 and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino (US 6,634,845) in view of Stall et al (US 5,544,618) and Makino et al (US 5,391,260).

Komino discloses a processing chamber (Fig 1) comprising:

Regarding claims 56 and 62, a processing vessel (chamber) PC having a lower wall (not labeled) and a side wall (not labeled) having a plurality of pumping ports (not labeled) disposed along the periphery of the floor in the lower chamber separated from each other, symmetrically spaced about a chuck assembly 84, and each pumping port connected to a pump cell (pump 88 and valve 89; Fig 16, Column 14, lines 42 - 64). Komino further discloses the pressure adjust valves 89 are closed when not in operation (Column 15, lines 25 – 28). Komino further discloses the pressure adjust valves 89 are closed when not in operation (Column 15, lines 25 – 37). The pressure adjust valves 89 are opened, when in operation, so as to maintain the process chamber PC at a predetermined pressure generated by the turbo molecular pumps 88 (Column 15, lines

26 – 32). When one of the pump 88 fails, the failed pump 88 (Column 17, lines 9 – 34) can be removed from the process module 80 while the process module is in operation so as to replace the failed pump. When the control unit 95 detects a failed pump 88 via one of the sensors 96, the control unit 95 closes one of the valves 89, corresponding to the failed pump 88 so as to close the passage between the failed pump 88 and the process chamber PC. Accordingly, the negative pressure environment can be maintained when the failed pump 88 is removed from the housing 82 of the process module 80. Thereafter, the failed pump 88 is repaired or replaced, and the normal pump 88 is mounted to the housing 82. The connection of the normal pump 88 is detected by the corresponding one of the sensors, and the control unit 95 opens the valve 89 and returns the evacuation capability of the rest of the pumps 88 so that the evacuation is resumed by the twelve pumps 88.

Komino does not disclose: Regarding claim 56, connecting a seal (valve, flange) to a second pumping port (one of the many pumping ports) such that the seal blocks the gas flow through the second pumping port.

Stall et al discloses:

Regarding Claim 56: an apparatus and a method of making an improved vacuum processing apparatus 10 (Fig 1) , comprising a processing chamber 100 (Fig 1), including a lower wall; an upper wall; a side wall coupled to the lower wall and the upper wall 104; and a plurality of pumping ports 178 (one pumping port disclosed in column 11, lines 14 – 21) and the other port not labeled (Figs 1, 2) formed in one of the lower cylindrical side wall 106 of the processing chamber; connecting a seal (blind flange, lid)

to the second pumping port (not labeled, 180 degrees across the exhaust port 178, Figs 1 and 2) such that the seal blocks the gas flow through the second pumping port. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a seal (valve, flange) in the apparatus of Komino such that the seal blocks the gas flow through a second pumping port as taught by Stall et al. It would have been obvious to a skilled artisan to combine the elements of prior art to yield predictable results such as providing a seal (valve, flange) in the apparatus of Komino such that the seal blocks the gas flow through a second pumping port as taught by Stall et al.

The motivation for providing a seal (valve, flange) in the apparatus of Komino such that the seal blocks the gas flow through a second pumping port is to optimize the apparatus of Komino and stall et al for exhausting the process gases from the chamber.

Komino and Stall do not disclose: Regarding claims 56, removing the lid from the second pumping port and providing a substitute pumping cell to the second pumping port.

Regarding claim 69, the substitute lid provided to the first pumping port is the lid removed from the second pumping port and the substitute pumping cell provided to the second pumping port is the pumping cell removed from the first pumping port.

However, it would have been obvious to a skilled artisan at the time the invention was made to remove the lid from the second pumping port and providing a substitute pumping cell to the second pumping port in the apparatus of Komino and Stall.

It would have been obvious to a skilled artisan at the time the invention was made to provide a lid to the first pumping port removed from the second pumping port and the substitute pumping cell provided to the second pumping port is the pumping cell removed from the first pumping port in the apparatus of Komino and Stall.

The motivation for removing the lid from the second pumping port and providing a substitute pumping cell to the second pumping port in the apparatus of Komino and Stall is to provide a pumping cell to the second pumping port for drawing vacuum in the apparatus of Komino and Stall.

The motivation for providing a lid to the first pumping port removed from the second pumping port and the substitute pumping cell provided to the second pumping port is the pumping cell removed from the first pumping port in the apparatus of Komino and Stall is to use the same part thus minimizing inventory for the apparatus of Komino and Stall.

Komino and Stall further do not disclose: Regarding claim 56, that the gas flow is reconfigured by the providing the substitute seal to the first pumping port and the providing the substitute pumping cell to the second pumping port.

Makino et al discloses:

Regarding claim 56, in the first to third preferred embodiments (Column 5, lines 56 – 67), the exhaust pump 18 is provided (Fig 6) on one side-wall of the vacuum processing chamber. This location of the exhaust pump will cause a deviation of gas flow towards the vacuum pump upon evacuation of the chamber. To cope with this deviation, a pair of exhaust pumps (Fig 7) 42 may be provided on the opposite lower

side walls of a vacuum processing chamber 41, so as to eliminate the deviation of gas flow upon evacuation (Column 6, lines 1- 6) of the chamber 41).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the gas flows towards the pumping cell of the second pumping port (reconfiguration of the gas flow towards the second vacuum port) when a seal (flange) is provided to the first pumping port blocking the gas flow in the apparatus of Komino and Stall et al as taught by Makino et al.

The motivation for reconfiguring the gas flow when a seal (flange) is provided to the first pumping port and a pumping cell is provided to the second pumping port in the apparatus of Komino and Stall et al is to provide a different exhaust gas flow direction to optimize the apparatus of Komino and Stall et al.

Regarding claim 68, Makino discloses, an upper electrode 93a (Fig 17) to facilitate the formation of plasma.

Claims 57 – 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino (US 6,634,845) in view of Stall et al (US 5,544,618) and Makino et al (US 5,391,260) as discussed in claims 56, 62, 68 and 69 above and further in view of Dandl et al (US 2001/0016166) and Os et al (US 6,178,918).

Komino, Stall et al and Makino et al do not disclose:

Regarding claim 57, the side-wall has a height of at most about four inches.

Regarding claim 58 and 59, process chamber is made of a plate stock of aluminum having a thickness of about four inches.

Dandl et al discloses:

Regarding claim 57, the vertical height of the space between a substrate and a partition wall 4 is of the order of 10.2 cm (about 4 inches, Para 0124, Fig 1).

Os et al disclose:

Regarding claim 58 and 59, a cylindrical process chamber made of aluminum.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the vertical height of the side wall about four inches; make the process chamber from stock of aluminum in the apparatus of Komino, Stall et al and Makino et al as taught by Dandl et al and Os et al respectively.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the process chamber from plate stock of aluminum of four inches thick in the apparatus of Komino, Stall et al and Makino et al as taught by Dandl et al and Os et al.

The motivation to provide a side wall with a height of about four inches is to optimize the size of the process chamber in order to minimize fabrication and other costs in the apparatus of Komino, Stall et al and Makino et al.

The motivation for making the process chamber from a single stock of aluminum plate is again to minimize fabrication costs in the apparatus of Komino, Stall et al and Makino et al.

The motivation for making the process chamber from plate stock of aluminum of four inch thick in the apparatus of Komino, Stall et al and Makino et al is to optimize the thickness of the processing chamber.

Claims 60 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino (US 6,634,845) in view of Stall et al (US 5,544,618) and Makino et al (US 5,391,260), Dandl et al (US 2001/0016166) and Os et al (US 6,178,918) as discussed in claims 57 - 59 above and further in view of Ishii (US 5,685,942).

Komino, Stall et al Makino et al, Dandl et al and Os et al do not disclose:

Regarding claim 60, the step of making the process chamber comprises a molding process.

Regarding claim 61, the lower wall is a plate and the side-wall is a rolled cylinder which is welded into the plate.

Ishii discloses:

Regarding claim 60, a plasma etching equipment 1 (Fig1) includes a processing housing 2 molded into a circular cylinder or a rectangular cylinder out of conducting material such as aluminum (Column 3, lines 30 – 35).

Regarding claim 61, it is well known in the art that two pieces can be joined together by welding.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a molding process for fabricating a process chamber in the apparatus of Komino, Stall et al, Makino et al, Dandl et al and Os et al

as taught by Ishii. It would have been obvious to a skilled artisan to combine the elements of prior art to yield predictable results such as using a molding process for fabricating a process chamber in the apparatus of Komino, Stall et al, Makino et al, Dandl et al and Os et al as taught by Ishii.

The motivation for using a molding process for fabricating a process chamber is to provide an alternate and equivalent means of fabricating process chambers as taught by Ishii.

Claims 63 - 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino (US 6,634,845) in view of Stall et al (US 5,544,618) and Makino et al (US 5,391,260), Dandl et al (US 2001/0016166) and Os et al (US 6,178,918) as discussed in claims 57 - 59 above and further in view of Ohmi et al (US 6,357,385).

Komino, Stall et al, Makino et al, Dandl et al, Os et al were discussed above.

Komino further discloses a chuck 84 (Fig 17) positioned inside the vacuum chamber. A plurality of valves 89 are provided on the pumping ports (not labeled, Fig 17) connected to vacuum pumps 88.

Komino, Stall et al, Makino et al, Dandl et al and Os et al do not discuss:

Regarding claim 63: providing three pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly.

Regarding claim 64, connecting three pumping cells to the process chamber, wherein each one of the three pumping cells are connected to a respective one of the three pumping ports and the three pumping ports being configured to receive said substitute seal in order to reconfigure the gas flow in the vacuum processing apparatus.

Regarding claim 65, providing two pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly on opposing sides thereof.

Regarding claim 66, connecting two pumping cells to the process chamber, wherein each one of the two pumping cells are connected to a respective one of the two pumping ports and the two pumping ports being configured to receive said substitute seal in order to reconfigure the gas flow in the vacuum processing apparatus.

Ohmi et al discloses:

Regarding claims 63 – 66, in Figs 44A, 45 and 46, various embodiments of a vacuum processing chamber are disclosed e.g., in Fig 44A, the vacuum container 4401 has a shape close to a square, and four vacuum pumps 4402 are provided in the comers of this vacuum container 4401; in Fig 45, three pumping ports (gas outlets, 4504) comprising three vacuum pumps and in Fig 45; and two pumping ports (gas outlets, 4604) comprising two vacuum pumps. Ohmi et al further discloses that in this way, if exhaust is carried out by a plurality of vacuum pumps aligned around the substrate substantially axisymmetrical to an axis perpendicular to the substrate surface and running through the center of the substrate, uniform gas flow can be realized in a rotational direction above the substrate, without causing hardly any lowering of gas conductance (Column 14, lines 55 – 67, Column 15, lines 1 – 10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide three pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly and containing three

valves and three pumping cells; provide two pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly and containing two valves and two pumping cells in the apparatus of Komino, Stall et al, Makino et al, Dandl et al and Os et al as taught by Ohmi et al.

It would also have been obvious that exhaust is carried out by a plurality of vacuum pumps aligned around the substrate substantially axisymmetrical to an axis perpendicular to the substrate surface and running through the center of the substrate, uniform gas flow can be realized in a rotational direction above the substrate, without causing hardly any lowering of gas conductance in the apparatus of Komino, Stall et al, Makino et al, Dandl et al and Os et al as taught by Ohmi et al.

The motivation for providing provide three pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly and containing three valves and three pumping cells; provide two pumping ports on the lower wall of the process chamber symmetrically spaced about the chuck assembly and containing two valves and two pumping cells in the apparatus of Komino, Stall et al, Makino et al, Dandl et al and Os et al is to provide an alternate and equivalent arrangement of vacuum pumps in a processing apparatus as taught by Ohmi et al.

Claim 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino (US 6,634,845) in view of Stall et al (US 5,544,618) and Makino et al (US 5,391,260) as discussed in claims 56, 62, 68 and 69 above and further in view of Carducci et al (US 2003/0038111).

Komino, Stall et al and Makino et al do not disclose: the process chamber is configured to have a chamber liner configured to reduce the open volume within the process chamber.

Carducci et al discloses:

Regarding claim 67, chamber liner 104 is disposed as a first liner 134, a second liner 118 and the lid liner 104 (Para 0056) adjacent to walls 106, 108 and the lid 102.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to install a liner in the apparatus of Komino, Stall et al and Makino et al as taught by Carducci et al respectively.

The motivation to provide a liner in the process chamber is to prevent the plasma gases from attacking the process chamber walls in the apparatus of Komino, Stall et al and Makino et al as taught by Carducci et al.

Claim 70 is rejected under 35 U.S.C. 103(a) as being unpatentable over Komino (US 6,634,845) in view of Stall et al (US 5,544,618) and Makino et al (US 5,391,260) as discussed in claims 56, 62, 68 and 69 above.

Komino, Stall et al and Makino et al were discussed above.

Komino, Stall et al and Makino et al do not disclose: removing the seal (valve) from the second pumping port includes removing the seal (valve) such that the seal (valve) does not contact the lower wall, the upper wall, or the side wall.

However, it would have been obvious (by looking at Fig 1 of Stall et al) to one of ordinary skill in the art at the time the invention was made that removing the seal from

the second pumping port, the seal will not contact the lower wall, the upper wall or the side wall in the apparatus of Komino, Stall et al and Makino et al.

Response to Arguments

Applicant's arguments filed 1/6/2009, with respect to claims 56 – 70 have been fully considered and are persuasive. The first rejection of claims over Stall et al in view of Ahn and Makino of 10/6/2008 has been withdrawn and therefore the arguments are moot. Also the claim objection to drawings along with 112 rejection is withdrawn.

However, arguments with respect to the second rejection of claims 56 – 70 over Komino in view of Stall and Makino is not persuasive and are being addressed below.

Regarding the arguments of claims over Komino, Stall and Makino:

The Office Action also rejected independent Claim 56 as being unpatentable over Komino in view of Stall and Makino. The above discussions of Stall and Makino also apply with respect to this rejection.

Similar to the combination of Stall and Ahn, the Office Action on pages 15 and 16 concedes that Komino and Stall does not disclose or suggest "removing the pumping cell from the first pumping port and providing a substitute seal to the first pumping port such that the substitute seal blocks a gas flow through the first pumping port; and removing the seal from the second pumping port and providing a substitute pumping cell to the second pumping port," but again takes the position that this removing and providing would have been obvious to a person of ordinary skill in the art for the reasons stated above.

Although Komino does describe that a valve 89 can be closed such that a failed pump 88 can be removed from a process module 80, as conceded by the Office Action, Komino does not disclose or suggest replacing the removed pump 88 at a pumping port that is different from the port which the removed pump 88 was removed from. Further, Komino does not disclose or suggest removing the valves 89 from the module 80 and utilizing them at a different pumping port.

Accordingly, it is respectfully submitted that the claimed removing and providing is not disclosed or suggested in Komino and Stall and would not have been obvious to one of ordinary skill in the art based upon the cited references

Therefore, it is also respectfully submitted that the combination of Komino, Stall, and Makino does not disclose or suggest every feature recited in Claim 56. Thus, it is respectfully requested that the rejection of Claim 56, and all claims dependent thereon, as unpatentable over Komino in view of Stall and Makino, be withdrawn.

Additionally, regarding the remaining secondary references (Dandl, van Os, Ichii, Ohmi, and Carducci), it is respectfully submitted that none of these secondary references cure the above-noted deficiencies of Stall in view of Ahn and Makino or Komino in view of Stall and Makino. Thus, it is respectfully requested that the rejections of Claim 56, and all claims dependent thereon, be withdrawn.

The Examiner disagrees:

Komino discloses a processing chamber comprising twelve nude type turbo molecular pumps. Komino discloses when one of the vacuum pump fails, the failed

pump 88 (Column 17, lines 9 – 34) can be removed from the process module 80 while the process module is in operation so as to replace the failed pump. When the control unit 95 detects a failed pump 88 via one of the sensors 96, the control unit 95 closes one of the valves 89, corresponding to the failed pump 88 so as to close the passage between the failed pump 88 and the process chamber PC which reads on the claimed language of claim 56 (which recites removing the pumping cell from the first pumping port and providing a substitute lid to the first pumping port such that the substitute lid blocks a gas flow through the first pumping port).

Komino further discloses after the failed pump 88 is repaired or replaced, and the normal pump 88 is mounted to the housing 82. Of course, Komino is referring to mounting the repaired pump (substitute pump) to the same pumping port.

Stall discloses a processing chamber comprising a port with a blind flange installed (not labeled) and a second port 178 through which vacuum is withdrawn in the processing chamber. Therefore it would be obvious to a skilled artisan that when the vacuum pump fails, to install a substitute pump to a second port by removing the blind flange first and then installing the substitute pump on it in the apparatus of Komino and Stall. Then remove the connected failed vacuum pump from the first port after closing the valve. Applicant should note Komino as discussed above teaches closing a valve (lid) and then removing the failed pump for maintenance. This would read on the claimed language of claim 56 (which recites removing the lid from the second pumping port and providing a substitute pumping cell to the second pumping port).

Makino discloses the deviation of gas flow in the chamber depending upon its location. Makino further discloses to cope with this deviation, a pair of exhaust pumps (Fig 7) 42 may be provided on the opposite lower side walls of a vacuum processing chamber 41, so as to eliminate the deviation of gas flow upon evacuation (Column 6, lines 1- 6) of the chamber 41). It would therefore be obvious that the chamber has multiple ports (not disclosed) and when only one vacuum pump is installed, the other port (s) has (have) to have either a lid or a valve in closed position to maintain a vacuum in the chamber which also reads on the claimed language of claim 56. In other words the gas flow is reconfigured by repositioning pumps and repositioning lids (valves) in the apparatus of Komino, Stall as taught by Makino.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SATISH CHANDRA whose telephone number is (571)272-3769. The examiner can normally be reached on 8 a.m. - 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, Primary Examiner, Jeffrie R. Lund can be reached on 571-272-1437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeffrie R. Lund/
Primary Examiner, Art Unit 1792

Satish Chandra

SC
1/11/2009